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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/683,537	01/16/2002	Gary R. Skillman	110241	7726

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EXAMINER	
PHAM, HAI CHI	

ART UNIT	PAPER NUMBER
2861	

DATE MAILED: 12/19/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/683,537	SKILLMAN, GARY R.	
	Examin r	Art Unit	
	Hai C Pham	2861	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 October 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-5, 7-13, 15-16, 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakajima et al. (U.S. 6,525,842 B1) in view of Luman (U.S. 6,476,845 B2) and Hardin (U.S. 5,631,920).

Nakajima et al. discloses a laser printer with reduced electromagnetic interference emission based on the frequency modulation of the clock signal, the printer includes a control unit (CPU 1101) coupled to the laser unit (1109), a data formatting unit (the image signal obtained by the CCD sensor 105 being provided to an image pre-processor or data formatter, which converts the image signal into digital data for input to the image processing unit 1111) (col. 11, lines 34-44), a clock circuit including a quartz oscillator (102) for generating a fundamental or reference clock, a spread spectrum clock generator (frequency modulation unit 102) for outputting a clock output signal (frequency-modulated clock signal) (Fig. 3), which has a reduced amplitude electromagnetic interference spectral components such that the electromagnetic interference emission at the laser unit is reduced (Fig. 1).

With regard to claim 8, Nakajima et al. further teaches the frequency modulation unit (1202) or spread spectrum clock generator being provided to be coupled to the laser unit (1109).

However, Nakajima et al. fails to teach the laser printer having an array of light emitting diodes (claims 1, 8), electrically chargeable photoreceptor on which the latent image is formed, developed with toner, and transferred to a transfer surface (claims 9, 18).

Regardless, it is old and well known in the printing art that a conventional laser printer for forming an image onto a photosensitive drum can be either a laser diode of an array of light emitting diodes as evidenced by Luman, which further indicates that the "difference between a laser printer and a LED printer is that an LED printer includes a print bar with a plurality of LEDs", wherein each LED would receive a separate pulse width modulator (col. 5, lines 3-8). Luman further teachs the provision of a charging station (38) for providing an electrostatic charge to the drum (34), a toner dispenser (42) to dispense toner on the drum at the area discharged by the light exposure from the LEDs, the toner on the drum being then transferred to print media (46) (col. 3, lines 29-52).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to provide light-emitting diode array as a light source as well as the electrostatically charged photoreceptor as taught by Luman in the laser printer of Nakajima et al. The motivation for doing so would have been to provide a simpler and more accurate printing engine than a laser beam printing engine would

allow since the latter uses a rotational scanner for forming an image on the surface of the photosensitive drum, and the incorporation of LED printing engine would require only routine skill in the printing art.

With regard to claims 2-5, 10-13, Nakajima et al. teaches the frequency modulation unit (102, Fig. 1 and 1202, Fig. 12) being based on the spread spectrum clock generator disclosed by Hardin (col. 4, lines 50-54 and col. 12, lines 9-16). Therefore, the frequency modulation unit would inherit all the features of Hardin's spread spectrum clock generator, which includes a clock pulse generator and a spread spectrum modulator (Hardin, col. 2, lines 32-47), the spread spectrum modulator being a frequency modulator (Hardin, col. 2, lines 64-66), and the frequency modulator being a profile modulator for modulating the clock pulse generator with a periodic waveform (Hardin, col. 2, line 66 to col. 3, line 9).

The method claims 15-16 are deemed to be clearly anticipated by functions of the above structures.

3. Claims 6, 14, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakajima et al. in view of Luman and Hardin, as applied to claims 1 and 15 above, and further in view of Zhang et al. (U.S. 6,240,123 B1).

The modified Nakajima et al. discloses all the basic limitations of the claimed invention except for the spread spectrum modulator varies up and down at an asynchronous rate to a clock strobe pulse.

Zhang et al. discloses an asynchronous spread spectrum modulation technique to generate spread spectrum clock signal, which is asynchronous to the reference clock signal to further reduce the total spectral energy that would otherwise contribute to the EMI emissions.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify the modified device of Nakajima et al. with the aforementioned teaching of Zhang et al. The motivation for doing so would have been to reduce the total spectral energy that would otherwise contribute to the EMI emissions as suggested by Zhang et al.

Response to Arguments

4. Applicant's arguments filed 10/03/03 have been fully considered but they are not persuasive.

With regard to Applicant's argument regarding Hardin, which "is concerned with the electromagnetic interference generated by the use of clock circuits per se" and that the teaching of Hardin "is in contrast to the present invention wherein although the generation of electromagnetic interference from clock circuits is of some concern, the more significant concern is with respect to electromagnetic interference generated as a result of the use of arrays of light emitting diodes in an image formation process", the examiner respectfully disagrees. In fact, as a background information, Applicant indicates that the individual LEDs are driven on/off by the digital circuits, which are synchronized by one or more clock circuits and that [G]enerally, the clock circuits have

a stable rate giving rise to energy emissions at a particular frequency" (see paragraph [0026]). Applicant then proposes the clock circuit "be coupled to an oscillator and a spread spectrum clock generator" to "vary the clock rates around a normal frequency" such that "the energy emissions are not as concentrated at a particular frequency, but are spread across a range of frequencies (see paragraph [0027]). In other words, the clock frequency of the clock circuit (such as the data clock shown in Figs. 2 and 3 of the present invention) is frequency modulated by the spread spectrum modulator such that the energy emissions are spread across a range of frequencies for EMI reduction purpose. The formatted image signal is then based on and/or synchronized to the resulting frequency modulated clock signal and send to the printing engine over the cable (Fig. 2). In the second embodiment of the present invention, the modulated image signal driving the individual LEDs would be again based on and/or synchronized to the resulting frequency modulated clock signal with the spread spectrum clock generator being provided within the printing engine (Fig. 3). The present invention is therefore concerned with the electromagnetic interference generated by the use of clock circuits, whose clock signal is frequency modulated by the spread spectrum modulator. Applicant points to paragraphs [0031] to [0033] of the present specification, which however do not provide any further clues other than the clock signal is frequency modulated by the spread spectrum modulator such that the electromagnetic interference emissions from the array of light emitting diodes are reduced. Such frequency modulation of the clock signal for EMI reduction is taught by Hardin, and thus by Nakajima et al., whose frequency modulation technique is based on that of Hardin.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hai C Pham whose telephone number is (703) 308-1281. The examiner can normally be reached on T-F (8:30-5:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin R. Fuller can be reached on (703) 308-0079. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722, (703) 308-7724, (703) 308-7382, (703) 305-3431, (703) 305-3432.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

HAI PHAM
PRIMARY EXAMINER

December 15, 2003